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EXECUTIVE SUMMARY OF THE
NATIONAL COMMUNICATION OF THE

UNITED STATES OF AMERICA

submitted under Articles 4 and 12 of the
United Nations Framework Convention on Climate Change

In accordance with decision 9/2 of the Intergovernmental Negotiating Committee of the Framework Convention on Climate Change (INC/FCCC), the interim secretariat is to make available, in the official languages of the United Nations, the executive summaries of the national communications submitted by Annex I Parties.

Note: Executive summaries of national communications issued prior to the first session of the Conference of the Parties bear the symbol A/AC.237/NC/___.

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INTRODUCTION

1. In June 1992 in Rio de Janeiro, world leaders and citizens of 176 countries gathered to agree on ways of working together to preserve and enhance the global environment. The Earth Summit aroused the hopes and dreams of people around the world and set in motion ambitious plans to address the planet's greatest environmental threats. We shared a common vision: to provide a higher quality of life for ourselves and our children.

2. At the Earth Summit, the United States joined other countries in signing the Framework Convention on Climate Change, an international agreement whose ultimate objective is to:

> achieve ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.

3. The United States and the international community has confronted the threat of global climate change because most scientists agree that the threat is real. There is no doubt that human activities are increasing atmospheric concentrations of greenhouse gases, especially carbon dioxide, methane, and nitrous oxide. Models predict that these increases in greenhouse gases will cause changes in climate locally, regionally, and globally, with potential adverse consequences to ecological and socioeconomic systems. The best current predictions suggest that the rate of climate change could far exceed any natural changes that have occurred in the past 10,000 years. Of course, there are uncertainties regarding the magnitude, timing, and regional patterns of climate change. But any human-induced change that does occur is not likely to be reversed for many decades or even centuries because of the long atmospheric lifetimes of the greenhouse gases and the inertia of the system.

4. With this global threat in mind, President Clinton stated on Earth Day 1993:

> "We must take the lead in addressing the challenge of global warming that could make our planet and its climate less hospitable and more hostile to human life. Today, I reaffirm my personal and announce our nation's commitment to reducing our emissions of greenhouse gases to their 1990 levels by the year 2000. I am instructing my Administration to produce a cost-effective plan ... that can continue the trend of reduced emissions. This must be a clarion call, not for more bureaucracy or regulation or unnecessary costs, but instead for American ingenuity and creativity to produce the best and most cost-efficient technology."

5. In October 1993, the United States released the Climate Change Action Plan, detailing the initial United States response to climate change. The Plan outlined a comprehensive set of measures to reduce net emissions, covering greenhouse gases in all sectors of the

economy. It focused on partnerships between the government and the private sector to help solve this pressing problem, and is now undergoing rapid implementation. The Plan laid a foundation for the United States participation in the international response to the climate challenge. And finally, the Plan included a process for monitoring its effectiveness and for adapting to changing circumstances.

6. The Climate Action Report, represents the first formal United States communication under the Framework Convention on Climate Change, as required under Articles 4.2 and 12. It is a snapshot description of the current United States programme. It does not seek to identify additional policies or measures that might ultimately be taken as the United States continues to move forward in addressing climate change, nor is it intended to be a revision of the United States Climate Change Action Plan. It is not a substitute for existing or future decision-making processes whether administrative or legislative or for additional measures developed by, or with the private sector. Meeting the formal reporting requirements in the Climate Convention, this document is also intended to identify existing policies and measures, and thus to assist in establishing a basis for considering future actions.

7. This document has been developed using the methodologies and format agreed to at the ninth session of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC). We assume that this communication, like those of other countries, will be reviewed and discussed in the evaluation process for the Parties of the Convention. We hope that the measures detailed here provide useful examples of possible directions for the future.

8. This chapter briefly describes the climate system science that sets the context for United States action, and then provides an overview of the United States programme, which is the focus of the remainder of this report. In particular, the United States includes information in this report on:

- national circumstances, providing a context for action in an inventory of United States greenhouse gas emissions;

- mitigation programmes; adaptation programmes; research and education programmes;

- international activities, including contributions to international financial mechanisms that address climate change; and

- a brief discussion of the future direction of the United States effort.

THE SCIENCE

9. The scientific community has long noted the potential for human activities to contribute to global climate change. A broad international consensus regarding this issue has been developed over the past several years (and has been reported in the Intergovernmental

Panel on Climate Change (IPCC) assessment reports); this summary is drawn from that consensus view. As the actions being taken by the United States ultimately depend on our understanding of the science, it is appropriate to review this information here.

10. The driving energy for weather and climate comes from the sun (see figure 1 - 1 on page 6 of the communication). The earth intercepts solar radiation (shortwave and visible parts of the spectrum). About one-third of that radiation is reflected, and the rest is absorbed by different components of the climate system, including the atmosphere, the oceans, the land surface, and biota. The energy absorbed from solar radiation is balanced, in the long term, by outgoing radiation from the earth atmosphere system. This terrestrial radiation takes the form of long-wave, invisible infrared energy. The magnitude of this outgoing radiation is determined by the temperature of the earth atmosphere system.

11. Several natural and human activities can change the balance between the energy absorbed by the earth and that emitted in the form of long-wave, infrared radiation. These activities are both natural (including changes in solar radiation and volcanic eruptions) and human-induced, arising from industrial and land-use practices that release or remove heat-trapping "greenhouse" gases, thus changing the atmospheric composition.

12. Greenhouse gases include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and ozone (0_3). While water vapor has the largest effect, its concentrations are not directly affected, on a global scale, by human activities. Although most of these gases occur naturally (the exceptions are CFCs, HCFCs, HFCs, and PFCs) human activities have contributed significantly to increases in their atmospheric concentrations. Many greenhouse gases have long atmospheric residence times (several decades to centuries), which implies that the atmosphere will recover very slowly from such emissions, if at all.

13. Internationally accepted science indicates that increasing concentrations of greenhouse gases will ultimately raise atmospheric and oceanic temperatures and could alter associated circulation and weather patterns. Large computer-driven climate models predict that the equilibrium change in the average temperature of the globe's atmosphere as a consequence of doubling of $C0_2$ or its equivalent is unlikely to lie outside the range of 1.5-4.5°C (2.5-8°F), with a best estimate of 2.5°C (4.5°F). The sea level rise associated with such doubling has been estimated to range between a few centimeters and one meter (about 2 inches to 3 feet), with a best estimate of approximately 20 centimeters (8 inches). Because of the large thermal inertia of the earth system, the equilibrium warming from added greenhouse gases is not reached until many decades after these emissions are released into the atmosphere.

14. While current analyses are unable to predict with confidence the timing, magnitude or regional distribution of climate change, the best scientific information indicates that such changes are very likely to occur if greenhouse gas concentrations continue to increase.

NATIONAL CIRCUMSTANCES: A CONTEXT FOR U.S. ACTION

15. A nation's vulnerability and response to climate change are greatly affected by its institutions, governing structures, economic arrangements, energy use patterns, land uses, population growth and distribution, and many other factors. United States policymakers must take into account the complexities and special characteristics of the political, social and economic orders in the United States. A description of land-use patterns sets the context for the discussion, in a subsequent chapter of climate change impacts and adaptation measures, while energy, economic, and political factors shape the United States approach to mitigating climate change.

16. The United States is by far the world's largest economy, although per capita gross domestic product (GDP) growth has slowed in recent years. The United States is also the world's largest producer and consumer of energy, and the largest producer of greenhouse gases. United States energy intensity (the amount of energy required to produce a unit of GDP) has improved by 27 per cent from its 1970 peak, remaining stable since 1986. Like other industrialized countries, the United States relies heavily on fossil fuels to power its industrial, residential, and residential and transportation sectors, although, as in other countries, renewable-energy sources, such as solar and biomass fuels, are anticipated to supply greater amounts of power in the coming decades.

17. Despite dramatic increases in the number of residences, number of electrical appliances, and amount of heated space per person, residential energy use has remained roughly constant, due to efficiency improvements. Energy use in the commercial sector has increased substantially, however, due to that sectors's extremely rapid growth. Industrial energy intensity has improved by over 35 per cent since 1972, resulting in energy savings of more than 12 quadrillion BTUs annually. A 34 per cent decrease in average per kilometer fuel consumption has partly offset a 50 per cent increase in vehicle kilometers travelled since 1969, resulting in continuing growth of energy consumption and associated greenhouse gas emissions in the transportation sector.

18. The United States has a large and diverse land area of approximately 931 million hectares (2.3 billion acres) including cropland, grassland, pastures, ranges, wetlands, urban/suburban areas, protected areas, and other special uses. Forested areas have expanded in the past twenty years, though the amount of old growth forests continues to decline over the past several decades, the rate of decline has slowed; wetlands are anticipated to be among the land areas most severely affected by climate change. The amount of land devoted to urban use continues to increase, although only approximately 4.5 per cent of total land area is classified as urban. United States population growth is slow overall, though immigration and internal migration contribute to faster growth in the South and in coastal regions, resulting in increased stress to coastal zones and heightened vulnerability to climate change. Low population densities in the United States result in relatively high energy use per capita, despite significant improvements in energy efficiency.

19. The United States has a market economy; the government has long played an important role in intervening to correct market failures and achieve various social ends. All levels of government have been involved in the protection of the environment. The federal Government has actively sought to improve the quality of the natural environment and promote public health for the past twenty five years. Most recently, government policies in a wide range of sectors are increasingly showing an awareness of the challenge of climate change. The Clinton Administration has made the formulation and implementation of its comprehensive Climate Change Action Plan a national priority.

INVENTORY OF GREENHOUSE GASES

20. The Framework Convention on Climate Change calls upon Parties to:

> "periodically update, publish, and make available to the Conference of Parties ... national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties."

This commitment was included in the Convention because it was clear to all countries that any effective climate policy must begin with an accurate inventory of gases that may influence global warming. A useful inventory must take into account the global warming potential of the various gases and analyze their production by different sectors of the economy, as well as account for their sequestration by carbon sinks, such as forests. At the ninth session of the INC/FCCC, guidelines for preparing greenhouse gas inventories were adopted; the discussion in this report follows the agreed format.

21. The most important anthropogenic greenhouse gases are carbon dioxide, methane, and nitrous oxide. Atmospheric concentrations of all three have increased significantly since the Industrial Revolution, almost certainly because of human activities. Based on a recent recomputation of 1990 United States greenhouse gas emissions following the INC guidelines, the United States estimates that net emissions totaled 1,348 million metric tons of carbon equivalent (MMTCE) (see table 1-1 on page 9 of the communication). This represents a decrease in the previous estimate of 1,462 MMTCE, which was used in the development of the Climate Change Action Plan.

22. The relative effects of greenhouse gases can be compared using global warming potentials. According to the 1990 inventory carried out by the United States, carbon dioxide accounted for 85 per cent of the total global warming potential of all United States anthropogenic emissions not controlled by the Montreal Protocol, followed by methane with 11 per cent, N_2O with 3 per cent, and HFCs and PFCs with 1 per cent. These percentages have not changed significantly since 1990, although the use of HFCs and PFCs is expected to increase in future years. Total emissions have increased slightly since 1990 (see figure 1-2 on page 10 of the communication).

23. United States emissions of carbon dioxide, the principal anthropogenic greenhouse gas, are divided fairly evenly among industry (34 per cent), transportation (31 per cent), and utilities (35 per cent, of which residences account for 19 per cent and commercial buildings for 16 per cent). Absorption of carbon dioxide in United States forests (carbon "sinks") has increased in recent years.

24. The principal sources of anthropogenic methane emissions are landfills (37 per cent) and agriculture (32 per cent), with coal, oil, and natural gas production accounting for most of the remainder. Nitrous oxide, an extremely potent greenhouse gas, is released principally through nitrogen-based fertilizers and industrial production of synthetic fiber.

25. Also included in the United States inventory are carbon monoxide (CO), nitrogen oxides (NOx), and non-methane volatile organic compounds (NMVOCs). These compounds have an indirect effect on climate change, for example, by increasing the atmospheric life of methane. Their relative and absolute contributions to climate change are uncertain.

U.S. MITIGATION ACTIONS

26. The Climate Convention calls for Annex I Parties (developed countries and countries with economies in transition to market economies) to aim to return their emissions of greenhouse gases to their 1990 levels by the year 2000. As with the reporting of inventories, the INC/FCCC, at its ninth session, agreed on a format for reporting measures to address emissions and sinks of greenhouse gases. This report follows that recommended format.

27. The basis for the United States response to the challenge set forth in the Convention is the Climate Change Action Plan, announced by President Clinton and Vice President Gore in October 1993. The Plan blends market incentives, voluntary initiatives, research and development, improved regulatory frameworks, and intensified existing programmes to achieve the reductions in emissions necessary to meet the United States commitment. As noted above, in 1990, United States emissions totaled 1,462 million metric tons of carbon equivalent (MMTCE). The Action Plan projects an emission level of 1,459 MMTCE by the year 2000, based on factors as anticipated in the fall of 1993.

28. The emission estimates reported in this section are slightly different from those used in the inventory described above. The data in the inventory chapter reflect recent guidance from the INC, which was only received after the actions in this section were proposed, analyzed, and adopted. A complete description of the inventory values used in Chapter 3 of the communication are reported in Inventory of United States Greenhouse Gas Emissions and Sinks for 1990-1993 (U.S. EPA 1994); and a description of the inventory estimates used in developing the emission reductions projected in this section are provided in the Climate Change Action Plan: Technical Supplement (U.S. DOE 1994). Along with this report, both documents are provided to the Parties of the Climate Convention as part of the formal United States submission.

29. The Plan's comprehensive, portfolio approach addresses energy demand in all sectors, as well as energy supply and forestry (see table 1-2 of the communication). This broad approach lessens the risk that poor performance in one sector will jeopardize the Plan as a whole. It is also cost effective. In undiscounted dollars, the approximately $60 billion in costs for the Plan from 1994 to 2000 are anticipated to be offset by approximately $60 billion in energy savings for businesses and consumers by 2000. An additional $200 billion in savings is anticipated for 2001-2010.

30. Voluntary programs and market-based incentives are at the heart of the United States approach. Two of the most prominent programs in this effort are Green Lights and Climate Challenge. In the Green Lights Program, over 1,500 organizations have committed to a national effort to improve the efficiency of their lighting systems. And more than 750 utilities, representing over 80 per cent of United States electric utility generation capacity, have already signed up for the Climate Challenge, under which they will inventory current emissions and commit to undertake and to report on actions to reduce greenhouse gases. Other aspects of the Plan improve information flows to private companies and encourage the accurate valuation of energy costs throughout corporate structures.

31. The Plan also concentrates on the reduction of methane and nitrous oxide, both of which have a greater global warming potential than carbon dioxide, ton for ton, and includes strategies to limit the growth of HFC and PFC emissions.

32. Although the United States provides a blueprint for reaching the near-term aim of the Climate Convention through domestic measures alone, it also recognizes the contribution that "joint implementation" could make toward achieving the Convention's goals. Thus, the United States is promoting cooperative efforts with other countries to take measures to reduce or sequester carbon. Toward this end, the United States has announced the United States initiative on joint implementation, which sets ground rules for the qualification and evaluation of joint implementation projects.

PROGRESS TOWARD IMPLEMENTATION

33. On the basis of assumptions regarding the costs of energy, the rate of growth of the United States economy, and the availability of funding for the programs outlined in the Plan, the United States projected a return of its greenhouse gas emissions to their 1990 levels by the year 2000. However, since the time these projections were prepared and the United States Action Plan was published, the economy has grown at a more robust rate than anticipated, the price of oil fell sharply before recently rising toward projected levels, and the United States Congress, which must appropriate funding for federal agency programs, does not, for now, appear likely to provide full funding for the actions contained in the Plan.

34. However, differences between earlier assumptions and current circumstances are only now being evaluated. Furthermore, the coming months will cause changes, either increasing or decreasing the gap. For example, the outstanding industry response seen in voluntary

programs that are, "unscored" in the current Plan could deliver benefits sufficient to make up any shortfall in "scored" programs. As a consequence, it is not yet possible to present a modified projection of the effects of measures outlined in chapter 4 of the communication, as a function of this difference, or to detail the additional measures that may be taken to close the gap. The United States is committed to a full review of the United States Action Plan in late 1995. In this review, a comprehensive analysis of the overlapping effects of the changes in economic assumptions and funding levels as well as changes in the anticipated effects of individual measures will be made. It is anticipated that, as a result of this review process, additional measures will be taken to ensure that the United States commitment is met.

IMPACTS AND ADAPTATION

35. The impact of global change on natural ecosystems cannot be predicted with accuracy, in part because these complex systems are not yet well understood. The government is working to increase our knowledge base through the federal interagency Committee on Environment and Natural Resources and through the United States Ecosystem Management Initiative. Both of these efforts bring together experts from many federal agencies to examine how systems can be understood and kept healthy in their totality. However, despite the best efforts of Governments to deal with the climate threat, it is unlikely that climate alteration can be avoided entirely. Further study is needed to see how natural systems can best adapt to climate change.

36. The National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine recently looked into the effects of climate change on the various principal ecosystems found in the United States (NAS/NAE/IM 1992). They found that United States water supplies, particularly some of the more vulnerable river systems, would be greatly influenced by possible increases in evaporation and changes in rain patterns. The extremely delicate wetlands and estuarine waterways found in United States coastal zones could be affected by sea level rise, alterations in upland water flow, human settlement patterns, and other consequences of a changed climate. United States agriculture and industry appeared relatively less vulnerable to climate change. Lightly managed ecosystems of whatever type, by contrast, appeared extremely vulnerable. Forest systems might find that their most favorable climates shift hundreds of miles to the north, perhaps too rapidly for the trees to adapt. Work on understanding the impacts from and adaptation to the effects of climate change will remain a priority of federal agencies for many years to come.

37. Among the key areas on which United States adaptation efforts focus are contingency planning and consideration of uncertainty in ranges of potential outcome. The increased unpredictability of future events due to climate change and the increased risks of surprises or large scale losses render this effort all the more important. Some of the efforts to manage for increased vulnerability include the establishment of the Floodplain Management Task Force, the efforts to better predict "El Niño" events (which lead to global changes in atmospheric behavior over relatively short periods), and water use and coastal zone management programs, which focus on some of the most vulnerable systems.

RESEARCH AND PUBLIC EDUCATION

38. Paramount to successfully mitigating and adapting to climate change is an ability to understand, monitor, and predict future changes. This, in turn, requires substantial research on the global climate system and the dissemination of such information to better enable society to respond appropriately. To address these needs, the United States has developed the United States Global Change Research Program, which, with a proposed budget in fiscal year 1995 of $1.8 billion, is the largest climate change research program in the world.

39. The United States Research Program, which is part of the Committee on Environment and Natural Resources, supports a wide range of policy-relevant research programs. These include trace atmospheric species and their effects on climate, the role of terrestrial and marine ecosystems in climate change and the impacts of climate change on these ecosystems, the socioeconomic and policy implications of climate change, and potential measures to mitigate and adapt to climate change. To facilitate the full and open exchange of climate change data, the United States Research Program is developing the Global Change Data and Information System, which will provide the infrastructure for linking global change data bases and information available within the various agencies of the federal government and will make them available to the public.

40. Recognizing the importance of international cooperation in global change research, the United States plays a major role in a variety of international efforts to understand and assess the state of knowledge about global change. The United States Research Program, in addition to its key role in support of domestic efforts, is a major contributor to international global change research programs, primarily through the IPCC, the World Climate Research Program, the International Geosphere-Biosphere Program, and the Human Dimensions of Global Environmental Change Program. In addition, the United States is engaged in bilateral research projects and internationally coordinated research programs involved with climate change, placing special emphasis on the development of networks and institutes to promote the development of regional capabilities to conduct global change research. Similarly, United States scientists are contributing research information and are playing leadership roles in the assessments of the IPCC, which is supplying much of the scientific input to the international policy decisions on climate change.

41. Since decision-making on national response strategies to climate change ultimately resides with the public, the United States is beginning to develop programs for general education, communication, and dissemination of climate change information. While many of these activities are organized under the United States Research Program, its member agencies have longstanding programs for educational outreach, many of which now are being extended to include climate change information and are turning from a purely domestic focus to include international activities.

INTERNATIONAL ACTIVITIES

42. The success of the Framework Convention on Climate Change relies preeminently on cooperation among nations. To foster closer international cooperation on climate change, the United States is engaged in a wide range of bilateral and multilateral activities.

43. The United States provides technical assistance and facilitates the transfer of energy-efficient technologies through its Country Studies Program, bilateral mitigation and adaptation projects, and information sharing and trade facilitation. The Country Studies Program, funded at $25 million over two years, helps developing countries and countries with economies in transition generate inventories of greenhouse gases, assess their vulnerability to climate change, and evaluate strategies for reducing net emissions of greenhouse gases and adapting to the potential impacts of climate change.

44. Over thirty-five bilateral projects aimed at mitigating climate change are supported by the United States government, through the United States Agency for International Development and other key agencies involved in the climate change issue. United States bilateral mitigation projects totaling about $1.5 billion include efforts on energy demand, power generation and distribution, renewables, clean coal, privatization, clean air, methane, and forestry. As part of its bilateral assistance programs, the United States also helps build capacity in countries to assess and/or minimize vulnerability to climate change.

45. A critical element of technology transfer is making information about available technologies easily accessible to foreign government agencies and private sector firms, and helping them secure financing for beneficial technologies. To meet this need, the United States has established a number of information sharing and trade facilitation programs, with 1994 funding for such projects totaling more than $10 million.

46. In multilateral fora related to global climate change policy matters, the United States plays a leadership role, which carries with it considerable financial responsibilities. In addition to participating actively in the INC/FCCC, the United States has provided substantial financial resources to both the trust fund enabling developing countries to participate in the negotiations, and a separate trust fund to support the basic costs of the negotiations and the INC secretariat.

47. In support of the Global Environment Facility (GEF), the United States has pledged $430 million (out of a $2 billion total) to the GEF's replenishment. United States bilateral programs will continue to strengthen collaboration with the restructured GEF as a complement to United States contributions to the core fund.

THE FUTURE

48. The United States is making significant strides toward reducing greenhouse gas emissions to their 1990 levels by the year 2000. To track the effectiveness of the programs and measures being implemented under the Climate Change Action Plan, United States agencies have established individual and joint tracking systems to develop performance indicators and progress milestones. Interim assessments to date show that significant progress has been made in meeting and in some cases exceeding these milestones, while in other cases specific measures are not performing as well as expected. However, the overall combination of changes in economic growth, in oil prices, and in energy demand currently suggests that the United States may need to implement additional measures to meet its commitment to return emissions to their 1990 level by the year 2000. It is important to recognize that the future effectiveness of current actions may be enhanced or diminished by changing circumstances in the domestic and international arenas.

49. As recommended by the guidelines adopted at the ninth session of the INC/FCCC, the United States has also provided a preliminary estimate of its emissions of greenhouse gases through the year 2010. Although the United States will continue to revise this estimate, the preliminary results indicate that to meet the ultimate objective of the Convention, the United States and all nations, will need to develop additional measures to combat the longer term trend of rising emissions. Toward this end, the United States has established a working group to devise a long-run strategy for examining all policies that could affect United States greenhouse gas emission levels beyond the year 2000, with particular attention being given to accelerating technology, research, development, and deployment.

50. Finally, in addition to continued activity in the domestic arena, the United States has been, and will continue to be, an active participant in international negotiations under the United Nations Framework Convention on Climate Change.